STUDY OF TERRITORIAL USE RIGHTS IN SMALL-SCALE FISHERIES: TRADITIONAL SYSTEMS OF FISHERIES MANAGEMENT IN PULICAT LAKE, TAMIL NADU, INDIA

by

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This document has been prepared as part of FAO's Regular Programme activities aimed at assisting fisheries administrators and others responsible for the management of fisheries. The attention of readers is also drawn to a series of technical papers relating to the PRACTICES OF FISHERIES MANAGEMENT, as well as to other papers in the Fisheries Circular series which address traditional fisheries management systems in other regions of the world. A list of these publications is given at the end of this document.

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ABSTRACT

This paper describes and analyses the system of traditional fishing rights in Pulicat lake, the second largest lagoon of India spreading across the States of Tamil Nadu and Andhra Pradesh. The system entails the granting of entitlements to eligible members of a particular community for undertaking specified fishing activities on certain designated fishing grounds of the lake. Whereas the system enjoys legitimacy with the lagoon fishermen and contributes to the prevention of conflicts within this group, it has come under increasing pressure from outsiders, including marine fishermen and dispossessed peasants and tribals. The paper suggests the need for strengthening the system through formal legalization and by the incorporation of control measures over fishing capacity and fishing intensity.

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1. INTRODUCTION

From the point of view of the total fish production of India, the contribution of lagoons is not very significant. Nevertheless, their waters have provided some examples of traditional management systems which incorporate inherent principles of equity. Pulicat lake in southern India is one such example where some of the villages have been practising a traditional system called padu[1] to regulate access to the fishing ground.

This is a study of the padu system with the object of understanding the distribution of access rights in the lagoon, its implications for the management of the fishing ground and the fishery resources. Our focus will be to examine the efficacy of this system in resolving conflicts in the designated waters and in ensuring better management of fishery resources. In this context we will also highlight various pressures on this system and how it copes with them.

In the first section we will discuss the general characteristics of the lagoon and its fishery. Physical features of the lagoon (also called lake), principal fishing methods and the demographic characteristics of the fishing population will also be discussed.

In the second section we will detail the access rights and describe how the rights are defined, distributed and managed. In this context the role of this system in managing demographic pressures and fishing efforts will also be dealt with.

The third section deals with the inter-village conflicts arising from the exercise of padu rights and their implications for the system. In the light of these conflicts, the attitude of the government towards the padu system will be discussed.

2. GENERAL CHARACTERISTICS OF PULICAT LAKE FISHERY

2.1 Physical features of the lake

Spreading across the coastal states of Andhra Pradesh and Tamil Nadu, Pulicat lake is the second largest lagoon in India, after Chilka lake. Situated between 13°24' and 13°47' N latitude and 80°2' and 80°16' E longitude, the lagoon is about 60 km in length and 0.2 to 17.5 km in breadth (Krishnan and Sampath, 1973). It has a high flood waterspread area of 460 km² and low flood waterspread area of 250 km². However, due to deltaic deposits, the lake is extensively shallow (Hornell, 1910).

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[1] Pronounced with 'a' as in 'father'.

The lake is confluent with the Bay of Bengal across a bar about 3 km from the Pulicat lighthouse on the Tamil Nadu side. The deepest portion of the lagoon is in the vicinity of the bar, taking the shape of a channel. The best fishing grounds are confined to these waters where the salinity is better maintained and the drying up of the lake is less severe. These are the fishing grounds where the padu fishing rights are granted.

During the rainy season (October to December) the flood level rises by several feet and in the dry season (between April and June), if the bar remains closed, the lake acts as a huge evaporating basin. Therefore, the water level in the lake can either be above or below the sea level and the salinity can either be very low or high, depending on the volume of flood discharge into the lake during the north-east monsoon. These factors have a great bearing on the flora and fauna of the lagoon and its fisheries.

2.2 Commercial fisheries of the lake

According to a study done by the Department of Fisheries, Tamil Nadu, in 1971-72 -- the only study that gives some idea about the total production from the lagoon -- the total catch of Pulicat lake comprises mainly prawns and mullets. Of the total production of 800 metric tonnes in 1971-72, about 50 percent comprised prawns (mainly Penaeus indicus) and 20 percent mullets (Mugil cephalus). Of the total landings, over 60 percent is landed in Pulicat. According to the fishermen, there has been a decline in production in the 1980s. Approximately 300 mt of prawns are caught from Pulicat now at a value of over Rs. 20 million.[2]

2.3 Fishing methods

Although Krishnan and Sampath (1973) have listed about nine types of fishing gear in Pulicat[3], the most important gears from the point of view of the fishery in the padu grounds are stake-nets and drag-nets which account for more than 70 percent of the total catch. They are locally known as suthu valai aand badi valai. Suthu valai is mainly used for catching prawns and badi valai for catching all species. In the padu grounds these gears can be used only by fishermen who enjoy access rights to these waters.

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[2] US$ 1 = Rs. 18.00 (approx.)

[3] Cast-nets, gill-nets, drag-nets, shore-seine, bag-nets, stake-nets, hook-and-line, vallikodi or lure fishing and adappu or impoundment.

(i) Suthu valai:

Suthu valai comprises two kinds of gear called tadukku and siru valai at a total cost of Rs. 5 000 at 1990 prices. Tadukku is a wall shaped nylon gear with mesh size varying from 12 mm to 50 mm. It is fixed with casuarina poles. The length of the tadukku varies according to the width of the fishing ground. The breadth of the tadukku is normally 8 ft.

Siru valai, the most important component, is a bag-net with mesh size ranging from 10 mm to 35 mm. It is broader at the rear (at about 80 ft) and narrower at the mouth (about 50 ft). The length of siru valai from the mouth to the bag-net is about 40 ft. The net is set by securing the lower side of the rear-end by stakes driven into the bottom. The lower side of the mouth is secured to the stakes holding the tadukku and the upper side has floats attached to keep it wide open (see Fig. 2).

The operation is done at night, mostly during the low tide when prawns migrate to the sea. To fix the siru valai the fishermen have to dive underwater from their light-drift, unpowered boats (called padagu). The crew size is normally two to three. The tadukku functions as a barricade in the path of the mobile prawns. Once they encounter the tadukku, they tend to swim against the current and consequently get caught in the siru valai.

Normally one fishing unit carries three sets of siru valai units but, in good seasons, as many as six units are carried by each group, denoting the frequency of removal and replacement of the gear. However, the tadukku is not removed once it is fixed. The operations of suthu valai are from shore to shore, virtually blocking the movement of prawns and thereby affecting the catch of downstream fishermen.

(ii) Badi valai:

If suthu valai has been used in Pulicat from ancient times, badi valai was introduced into Pulicat -- probably from the marine sector -- only in 1905 (Madras Fisheries Department, 1932). This gear involves the heaviest cost in Pulicat, about Rs. 60 000 at 1990 prices. Until the cyclone of 1984, this was the most important fishing gear in Pulicat and the symbol of affluence.

Badi valai is essentially a nylon drag-net almost in the shape of a shore-seine, mainly used for catching mullets and other species during the neutral phase of the tide. It is mainly operated in fishing grounds which have gradual slopes and sandy (or muddy) bottoms. The net has two wings, each about 6 m broad, and a deep bag about 10 m long and 12 m broad. The head rope has floats attached to it. The entire unit is about 800 to 1 000 m in length. The mesh size gradually decreases from 50 mm to 30 mm in the wings and further to 15 mm in the bag (see Fig. 3).

The operation of badi valai involves 25 to 80 people and about three to four padagu. It is normally undertaken during the neutral phase of the current and the frequency of operation is six to eight times, depending on the tide. Two of the craft carry the gear, and the other two the crew and the catch.

Not all the 80 participants are entirely involved in the operation of the gear. About six to 12 are involved in preparing the gear for the operation, and about four to six in drying the gear once the operation is over. The rest participate in the actual operation which involves paying out the net from the boats (very similar to the operation of beach-seines) and hauling it from the shore. Each operation may take about three to four hours. Normally the valai is used continually from 3 a.m. to 6 a.m. the following day. A good day's catch may fetch about Rs. 20 000 in value.

2.4 Fishing population

The total population around the Pulicat lake is about 28 000, spread over 50 kuppams (settlements). It is comprised predominantly of fishermen who belong to the traditional marine fishing caste called pattanavan (which literally means "a dweller in a town or pattanam")[4]. The others include Harijans who are primarily involved in the lake fishery, and tribals (Irulas) who have moved into the lake fishery from the agricultural sector.

Two-thirds of the settlements are on the Tamil Nadu side, accounting for over 15 000 of the total population. While most of the fishermen around the lake fish in its waters, those on the eastern boundary are either those who fish in the sea or those who combine lake fishing with marine fishing.

While all the pattanavars living in settlements near Pulicat town are full-time fishermen, those living further north are not. This is because throughout the year the fishing grounds off Pulicat town are productive. Since the lake dries up in some of the northern parts in the summer, fishermen in those areas can undertake fishing only during the monsoon time.[5] From this point of view, the fishermen living in Pulicat are much better off than those in the northern waters of the lake.

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[4] The pattanavans have two main divisions, periya (big) and chinna (small) pattanavans. In the caste hierarchy periya pattanavan is regarded superior. Most of the pattanavar fishermen of Pulicat are periya pattanavar

[5] These fishermen sometimes move south as labourers to operate badi valai or they transport firewood and mollusc shells to Pulicat and Madras (Krishnan and Sampath, 1973).

3. CONTROL OVER ACCESS TO THE LAKE WATERS

Although the lake is over 400 km² in area, our study is confined mainly to the fishing grounds within a 5 km radius from the bar. These are the waters controlled by fishermen of three villages called Kottai kuppam, Naduvoor kuppam and Andi kuppam which are on the Tamil Nadu side of the lagoon (see Fig. 4). The fishermen of these villages practise a system locally called padu to control access to certain fishing grounds in the proximity of the bar.

3.1 The talekettu system

Before we get into the discussion of the padu system, it is important to consider another form of customary control of access rights called the talekettu which is practised in some of the marine and lagoon fishing villages to the north of Madras city. Talekettu is a village level organization of fishermen based on caste and gender. A male member belonging to a certain caste and village can become a member of talekettu if the village council (grama panchayat) confers eligibility rights on him. This is, in turn, dependent on the general level of skills of the candidate and the degree of his acceptability by the village.

Normally the male parent of the prospective candidate approaches the village council on behalf of his son once the boy reaches the stipulated age of membership (normally 15). If the panchayat confers membership, the parent will have to pay the membership fee. In return for his right of access to the fishing grounds, the member has to bear responsibility jointly with others towards the common expenditure of the village, like temple festivals, litigation, etc. To become a member of the padu system it is essential that the fishermen belong to the village talekettu first. In other words, padu is subsumed under the institution of the talekettu.

3.2 The padu system

"Padu" literally means "fishing site" and has a tempero-spatial connotation. It is used by some Indian and Sri Lankan fishermen's communities who practise the system of rotating access to a fishing ground (e.g., in the beach-seine fishery, stake-net fishery, etc.) to denote their turn or allotted fishing ground (for Sri Lanka see Alexander, 1982; Atapattu, 1987). In India the padu system is practised by the beach-seine fishermen of the Tamil Nadu coast and the lagoon fishermen of Pulicat lake. According to the fishermen of Pulicat, this system has been practised from time immemorial. However, the assertion of these rights in a pronounced manner seems to have taken place only with the development of an export market for prawns in the early 1970s.

The padu system as practised in Pulicat may be defined as a traditional system of granting entitlements to eligible members of a particular community for undertaking specified fishing activities in certain designated fishing grounds of the lagoon.

These fishing grounds fall within a radius of 5 km from the bar of the lake, where the salinity of the water is better maintained and the drying up of the lake is less extreme. The system is caste-specific (only periya pattanavars can participate); gear-specific (entitlements are for the operation of suthu valai and badi valai) and area-specific (applicable only to three fishing grounds in the vicinity of the bar mouth).

The implicit function of the system is different for suthu valai and badi valai. While it tries to ensure equitable access for all the eligible fishermen to all the fishing grounds in the operation of the former, for the latter it tries to ensure equal opportunities for all the units in the designated grounds. In other words, in the former case it tries to ensure equitable access to all the groups of individual fishermen, while in the latter to all the badi valai units (Table 2 elaborates the distinction).

The eligibility criterion is determined by the marital status of fishermen belonging to the specified caste. Only married fishermen who are members of talekettu are allowed to participate in the padu system.

The fishing grounds under the padu system

The padu system is practised mainly by the fishermen of Kottai kuppam, Naduvoor kuppam (or Christian kuppam) and Andi kuppam. There are three designated fishing grounds: Vadakku padu, Munthurai padu and Odai padu (see Fig. 4). These padus form the deepest part of the Pulicat lake and never dry up. During the dry season most of the fishery resources of the lagoon get confined to these waters.

Vadakku padu is to the west of the bar mouth in a north-south axis, stretching from Pulicat lock up to Annamalaicheri. Munthurai padu is confluent with the sea and occupies the area between Gunan kuppam and the bar mouth on the eastern boundary of the lake and between Pulicat lock and Karimanal on the west. Odai padu is to the south of Munthurai padu, almost coinciding with the Buckingham canal. It stretches from Sattan kuppam to Gunan kuppam (see Fig. 4).

While Munthurai padu is spread out, the other padus are in the shape of a canal. The productivity of these padus varies from one another. Vadakku padu is the most productive and is intensely fished. Odai padu is the least productive and is almost abandoned by the padu fishermen now.

The areas of these padus are as given in Table 1.

Table 1. Area of Padu Fishing Grounds

Name of the padu	Area* (km^2)
Vadakku padu	1.25
Munthurai padu	2.50
Odai padu	0.45
Total	4.20

* Area figures are approximations

To facilitate intra-village allocation of fishing space, these padus are further divided into smaller units (See Annex). Thus, Vadakku padu comprises 13 locations (these are also called padu) and Munthurai padu 12 (see Annex). However, there is no strict demarcation of boundaries. Since Odai padu is almost abandoned, it is not included now while allotting the fishing grounds.

Allocation of access rights under the padu system

Although entitlements are granted to the eligible fishermen in the padu grounds, the content of these entitlements differ from gear to gear, from suthu valai to badi valai. It must be mentioned at the outset that suthu valai is owned by all the eligible fishermen, whereas badi valai units are owned by only a few. In the following section we will discuss the padu system as applicable to suthu valai and badi valai.

(i) The padu system for the operation of suthu valai:

The system ensures equitable access to the padu grounds to all the eligible fishermen of the three villages through a lottery system[6]. This task is undertaken by villages independently of one another. Each village knows at the outset the days of a year designated for that particular village in the specific fishing grounds. On days considered auspicious, the villagers meet independently to draw lots and allocate the fishing ground among their eligible members. Thus, Kottai kuppam and Andi kuppam meet at the Kovil mandapam (temple premises) on the 15th December and Naduvoor kuppam in the church compound on the 1st of January.[7] The day on which the lots are drawn is called the padu kulukkal day. It is undertaken under the auspices of the village panchayat (the village council at the informal level).

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[6] Interestingly, the system does not try to ensure equitable distribution of the returns from the fishery among the village members. According to the fishermen, such a system will lead to sloth!

[7] Although the fishermen of Naduvoor kuppam are Christians, they also belong to the same caste as the other padu fishermen.

The process is as described below. Within each village two broader groups are formed, one for Vadakku padu and another for Munthurai padu. These groups are further divided into smaller groups depending on the total number of eligible fishermen in each village. In Kottai kuppam and Andi kuppam these groups comprise three members each and in Naduvoor kuppam two members each[8]. This is the basic unit of the village population that participates in the padu system.

The group configuration may change from year to year but not during the same year. The membership in a group is not based on kinship lines. When the lots are cast, only the groups are named, not the individual fishermen. Once the lots are drawn, the names of the groups and their padus are noted down in a register kept by the Chettiar (chief of the caste panchayat). The right to the padu is inalienable, cannot be leased out or sold. If a particular group is unable to fish on its allotted day, the talekettu of its village have the right to operate in that fishing ground on that particular day.

Thus, every group within each village will have a designated fishing site once the lots are drawn. The same village will fish in both the fishing grounds on its allotted days from 6 p.m. to 6 a.m. The two groups within the same village will alternate between Vadakku padu and Munthurai padu. Thus, for example, if fishermen's unit A belonging to Group I is fishing in site no.1 of Vadakku padu on a particular day, it will fish in site no.1 of Munthurai padu on its next assigned day. On the third day it will go back to Vadakku padu site no.2 and on the fourth day to site no.2 in Munthurai padu, and so on and so forth until it completes the padu cycle. This is the case for all the fishermen.

Thus, both the groups formed for the two respective fishing grounds will have to alternate between them. Since Vadakku padu, the upstream fishing ground, is more productive than the downstream Munthurai padu, the alternating arrangement gives all the eligible fishermen equal access to the former.

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[8] Each larger padu can accommodate a maximum of 28 fishing units (see annex for the distribution). Thus, the two padus together can accommodate 56 units. The crew size per unit is three. Therefore, the maximum number of fishermen the padus can accommodate is 168. Since Naduvoor kuppam has 240 eligible fishermen (Kottai kuppam 168, Andi kuppam 150), all of them cannot be accommodated on the same day. Therefore, they have further divided the total number of eligible fishermen into smaller groups of two which undertake fishing on alternate days.

According to this system, although each village has 10 days in a month to operate its padus, the actual number of days for the operation of suthu valia is much lower. There are only 14 good fishing days in a month, i.e., three days before and after the full moon and new moon days for the prawn fishery, which is the mainstay of the padu fishing grounds. These are the days when the tidal activity is enhanced, influencing the active movement of prawns towards the sea. In other words, each village has, on an average, five days in a month.

The unequal productivity of the fishing grounds also restricts the number of fishing days. Frequently, fishermen do not exercise their access rights to Munthurai padu because of its low productivity and wait instead for their turn in Vadakku padu. Thus, in effect, each village has access to the best fishing ground only once in 12 days, or for 30 days in a year, although they are entitled to fish for 120 days.

According to the fishermen, the day lots are drawn and they can generally foresee the catch potential of prawns for that particular year in their allotted fishing grounds. This is because the relative catch potential of different fishing sites in conjunction with the lunar cycle is already known to them. In addition, the relative efficiency of units fishing upstream can also be known from the constitution of those groups. If these units are relatively more efficient, the downstream units will not be able to get good catches.

(ii) The padu system for the operation of badi valai:

Unlike suthu valia, badi valai is not operated by all the eligible fishermen. It is under family ownership and the total number of turns for this gear in the padu grounds depends on the total number of eligible fishermen in each family. The eligibility criterion is marital status, as in the case of padu rights for suthu valai operations. Each village has about five units. On a particular day, each village can operate one badi valai in Kottai kuppam and Andi kuppam. In Naduvoor kuppam two badi valai units can be operated.

The number of turns for each badi valai unit can normally vary from one to three. Thus, for example, in Kottai kuppam the maximum number of turns for badi valai units is 15. These turns are distributed by drawing lots, as in the case of suthu valai.In 45 days, for example, Kottai kuppam will exhaust its turns.

On days when badi valai is operated the fishermen who have padu rights for the operation of suthu valai do not normally exercise them if the badi valai has to be operated in areas where they have the rights.

(iii) Differences in padu rights between suthu valai and badi valai:

As can be seen from the above discussion, there are differences in the content of rights between suthu valai and badi

valai operations. The following table summarizes the major differences.

Table 2. Differences in Padu Rights Between Different Fishing Gear

	Suthu valai	Badi valai
1.	Only eligible fishermen can participate	Anybody can participate
2.	Group-specific rights	Owner-specific rights
3.	Site-specific with respect to the number of locations in each padu	Site-specific only with respect to the larger padu
4.	Species-specific	Species-non-specific
5.	Operational time: 12 hrs	Operational time: over 24 hrs
6.	Frequency of operation according to the system of rotation of rights	Frequency of operation depending on the number of eligible fishermen in the family of ownership
7.	Ensures equitable access to all the eligible fishermen	Ensures equitable access to all the owners of gear

The differences in access rights for sathu valai and badi valai give an idea about the structure of the village community. The badi valai owners form the "elite" and are normally in positions of power in the village. The village head (the Chettiar) and his counsellors (the panchayatars) are usually the owners of badi valai. As is evident from the above table, badi valai rights are less equitable than the suthu valai rights.

The importance of badi valai is now declining because of environmental factors. After the 1984 cyclone, which severely affected the Pulicat lake, traditional grounds for the operation of badi valai changed drastically. Many of the grounds that were ideal for the operation of badi valai became deep and uneven, preventing the use of the gear. In addition, the fishing grounds on the northern side have become full of oysters further preventing the operation of badi valai from the water. The frequency of badi valai operations, therefore, has declined. If badi valai was the symbol of prestige before 1984, suthu valai holds that position after the cyclone.

3.3 The padu system, demographic pressure and the control of fishing effort

As mentioned before, the access rights to the lake are at two levels. At the broader level there is the institution of

talekettu and at the specific level in relation to certain fishing grounds, fishing gear and species there is the padu system. In the following section we will examine the degree to which the latter system regulates fishing effort. In this context, we will also discuss how the padu system handles demographic pressures on the fishing ground.

Demographic pressure

Demographic pressures do not seem to have been a concern until the 1980s. Until then, inspite of a shrinking resource space in real terms, the conditions for becoming a padu fisherman were not very stringent. Thus, for example, until 1980, in Andi kuppam all talekettu were granted padu fishing rights. Similarly, until the early 1980s, fishermen from other villages belonging to the same caste were allowed to participate in the padu fishery. But, from the 1980s onwards, only married fishermen from the three villages enjoying padu rights are granted the eligibility to participate. Inspite of this measure, the pressure on fishing grounds continues to increase.

To cope with this pressure two measures were taken by the padu fishermen. These are:

a) further sub-division of the fishing grounds into smaller units; and

b) expansion of the crew-size per boat from two to three.

Despite these measures the fishing grounds continue to get more saturated and cannot take any more new units according to the fishermen. Right now there are over 550 eligible fishermen in the three villages and on any given fishing day the padus can accommodate only 168 fishermen (56 units). The following table gives the population of eligible fishermen in the respective villages.

Table 3. Total Population and the Number of Eligible Fishermen in the Padu Villages

Name of the village	Total population* (1989)	No. of eligible fishermen
Kottai kuppam	701	168
Naduvoor kuppam	1 311	240
Andi kuppam	510	150
Total	2 522	558

* Integrated Fisherfolk Development Project Pulicat.

As can be seen from the table, Naduvoor kuppam has an excess population of 72 eligible fishermen. As a result, they have devised a third measure to accommodate the redundant population.

A shift system has been introduced, each shift having 120 fishermen operating in groups of two. This has led to a further division of allotted days in Naduvoor kuppam. While fishermen from Kottai kuppam and Andi kuppam have access to their fishing ground once in 10 days, those from Naduvoor kuppam have access only once in 20 days because of this arrangement.

Since the fishing grounds are already given and further expansion of the padus is not possible, an increase in the population of eligible fishermen can be accommodated only through an increase in the crew size of a fishing unit or by a further division of fishermen into more numbers of groups or by increasing the number of shifts. The fishermen from Kottai kuppam and Andi kuppam, in fact, fear that the crew size may have to be increased to four in the near future.

Intensity of fishing effort

The control of access rights to the padus and the regulation of demographic pressure have not in any way led to lower intensity of fishing effort in the fishing grounds. This situation is further complicated by the falling productivity, particularly of Munthurai padu. All the fishing sites are already optimally utilized. Since every village has to take its turn, there is virtually no holiday for the fishery.

While operating suthu valai, e.g., the gear is set from shore to shore. The bag-net, called siru valai, which accumulates the catch, is frequently changed to maximise the catch during the movement of prawns at the neep tide time. Similarly, badi valai is also intensely used during the exercise of padu rights for this gear. During the dry season, when the water level recedes and the salinity increases, badi valai is used very vigorously to remove all the fish that accumulates in the deeper portions of the lake.

The padu system ensures that the designated fishing grounds are not overcrowded, but does not lay down any restrictions on the frequency of fixing the stake-nets nor on the maximum permissible catch in a single day's fishing operation.

According to a study on Pulicat lake by the Department of Fisheries, Tamil Nadu (Krishnan and Sampath, 1973), there is considerable overfishing of juvenile and breeder mullets by badi valai fishermen. One of the recommendations in the report is to ban badi valai operations to prevent overfishing of mullets.

However, effort control measures are not discussed in the village panchayats. Fishermen are of the view that their fishing practices do not have any bearing on the fishery stock of the lagoon.

They do, however, acknowledge a decimination of fishery stock, particularly of certain species of prawns and mullets, but attribute this to extraneous factors. Intensity of fishing in

the marine sector and natural phenomena like drought[9], cyclones, etc., are held responsible for this situation. According to them, tiger prawn has almost disappeared from the lagoon; mullets and polynemus stocks have been drastically reduced. Koduva fishery (Lates calcarifer), which was an important fishery until the 1960s, has become extinct.

But the badi valai operators do not hold themselves responsible for overfishing of mullets. Intensive fishing of mullets takes place in the August-October months, when the bar mouth is either very shallow or blocked, preventing the migration of species from the lake to the sea and vice versa. During these months, when the freshwater discharge into the lagoon is negligible, the salanity level of the lake and the temperature of the water go beyond that of the sea. In such conditions, according to the fishermen, left to themselves, the mullets would only die.

Even though the intensity of fishing is high, there has been no addition to the size of the suthu valai over the last 20 years. But in the case of badi valai there has been an increase in size from 800 m to 1 000 m in length and from 10 m to 12 m in breadth. Similarly, the length of the padagu has increased from 27 ft in the 1970s to 31 ft in the 1980s.[10] The principal innovation vis-a-vis fishing gear is the shift from cotton to nylon yarn in the late 1970s. In other words, the high intensity of fishing arises mainly from an increase in frequency of the gear operations.

However, there has been a redundance of suthu valai gear and padagu in the padu waters. Although the maximum number of units that can operate in a day is 56, there are altogether 186 crafts in the three villages. Similarly, every eligible member has at least one suthu valai each. In other words, the control over access rights to the padu grounds has not led to any optimisation of investment in the fishery. On the other hand, there is considerable overinvestment.

The pressures on the system from within are enormous and arise mainly from shrinking fishing space, decimation of resource and demographic pressure. These arise from environmental factors and intensity of fishing effort. As mentioned before, Odai padu is abandoned and Munthurai padu has become very unproductive leading to an increased pressure on Vadakku padu.

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[9] Pulicat lake was badly affected by droughts in 1985, 1986 and 1987, leading to considerable decrease in fresh water discharge into the lagoon.

[10] These are unpowered, flat-bottomed, plank-built boats made of teak, modelled after the cargo boats of Pulicat lake.

The increase in demographic pressure is already reducing access to the fishing ground. However, it is to the merit of the system that it prevents a wholesale transfer of incremental growth in population of eligible fishermen to the fishing grounds.

The padu rights and inter-village conflicts

The internal fragility of the padu system is worsened by outside pressures arising from claims on the padu grounds from the marine-side villages. This is further complicated by political interference.

As mentioned in the introduction, two-thirds of the settlements around Pulicat lake are on the Tamil Nadu side. The largest concentrations of these settlements are sandwiched between the lake and the sea to the south of the bar (see Fig.5). These settlements are either involved in full-time marine fishing or combine marine with lagoon fishing.

These fishermen do not honour the padu rights and there have been periodic conflicts over the padu waters right from the 1930s. Thus, although padu fishing rights enjoy legitimacy amongst the scattered lagoon fishermen, they do not have any hold over most of the eastern fishermen. As a result of these conflicts, as early as the 1930s, the padu fishermen had to concede fishing rights in a smaller area of Munthurai padu to those of Gunan kuppam and Lighthouse colony (see Fig. 5).

The 1978 conflicts

The padu rights continued to be resented by the marine-side fishermen and this resentment grew with the development of an export market for prawns in the 1970s. It finally erupted into an open conflict in 1978 when the kattumaram fishermen attacked the padu villages. They were allegedly instigated by the then ruling party of Tamil Nadu. As a result of these clashes, the padu fishermen were forced to make further concessions in Munthurai padu, particu-larly in the waters near the bar, in favour of Gunan kuppam, Lighthouse colony and Donirevu.

The 1989 conflicts

These problems were further aggravated in 1985 with the eviction of fishermen from Sriharikotta island (see Fig. 5). The evicted fishermen were resettled on the south-eastern side of the lagoon. They laid claims on the padu waters, contending that the government authorities had promised them rights to the lake fishery when they were evicted from the island.

This time, two of the villages that had extorted concessional rights from the padu villages in 1978 now became their supporters. Together they contested the claims of resettled fishermen and refused them permission to fish, arguing that the government had no authority to grant fishing rights in the padu waters. They insisted that the resettled fishermen should fish

only on the marine side. As a result, from 1986 there were frequent conflicts which in early 1989 led to the death of nine fishermen (Vidyasagar and Rajadurai, 1989). The situation continues to be tense even today.

The conflict of 1989 led to government intervention. At the behest of the revenue authorities, the padu fishermen had to make further concessions in their waters. As a result, the relocated fishermen were allowed to fish using gill-nets (arai valai) for 50 days from 6th November to 25th December every year.

Response to conflicts by the lagoon fishermen

The fishermen holding padu fishing rights are visibly perturbed by the increasing number of concessions they have to make to accommodate 'outsiders' in the padu fishing grounds. Firstly, portions of Munthurai padu had to be given up in the 1930s and late 1970s. Secondly, the resettled fishermen had to be accommodated in their fishing grounds for 50 days in a year. They are also piqued by the attitude of the government in supporting the claims of the "outsiders".

On the whole, there is tremendous pressure on the padu villages from outside to open up their waters for the free use of all. The pressures are not only from the marine fishermen but also from landless labourers and dispossessed tribals who want to eke out a living from the lake. However, the pressure has so far been confined to Munthurai padu and Odai padu which have lower productivity. No concessions have had to be made in the most productive of fishing grounds, viz., Vadakku padu.

In response to the pressures from "outside", soon after the 1978 conflicts, 24 lake-side villages formed an organization called Pazhavercaud Yeri Meenavar Nattu Padagu Aikya Sangam (Association of Traditional Lake Fishermen of Pulicat). Although it was formed in the wake of the first wave of clashes, it became active only after the recent developments. This association broadly encompasses all talekettu belonging to the lake fishing settlements who honour the padu system.

The arguments used against the "outsiders" by the padu fishermen, based on moral axioms of "caste" and "tradition", are interesting. When tribals and nonfishing castes move into the lake waters, they are reminded of their caste origin and are asked to keep to their caste-based occupations. When marine fishermen who belong to the same caste as the lagoon fishermen move in, they are asked to keep to their own traditional fishing grounds and methods -- which are the sea and the kattumaram fishery -- instead of getting involved in the padu system. It is implied in these arguments that only members of fishing castes should undertake fishing and that it should be confined to their traditional fishing grounds.

A binding solution to the frequent conflicts, as perceived by the fishermen, is for the government to recognize their traditional use rights to the padu grounds and grant them title-deeds to these waters.

Attitude of the government

The State government authorities do not formally recognize the control of access rights to the waters. The padu system is perceived as an exploitative arrangement by a limited number of fishermen for their own benefit. The government does not legitimize territorial use rights in fisheries and is of the view that the conflicts can be resolved only with the strengthening of the government machinery in Pulicat.

The government favours replacement of the padu rights with a licensing system on the grounds that padu has resulted in overfishing of the lagoon waters and its practice has become a source of potential tension between different user-groups. According to officials of the Department of Fisheries, Tamil Nadu, efforts are underway to introduce registration and licensing in Pulicat under direct government supervision[11]. The authorities are of the view that only those who can afford to pay the licence fees and are willing to abide with government regulations should be given the right to fish in the lagoon.

4. CONCLUSION

The padu system as practised in Pulicat lake is quite unique because of its caste-based nature and the distribution of access-rights with adequate attention paid to the uneveness in productivity of the fishing ground. It may be defined as a traditional system of granting entitlements to eligible members of a particular community for undertaking specified fishing activities in certain designated fishing grounds of the Pulicat lake.

Considering the distribution of fishery resources in the lagoon waters, the limitations of the fishing ground and the preponderance of fishermen around the lake, it is clear that the padu system has contributed to the sustainability of the lagoon fishery. Inspite of the fact that conservation of the resources is not the principal aim of the padu system, the control over access-rights -- limiting them only to the members of the padu system -- perhaps has indirectly contributed towards preventing a collapse of the lagoon fishery.

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[11] In fact, a licensing scheme for Pulicat lake was formulated in 1979 after the 1978 clashes, but it was not implemented. This system though legally still valid, is concerned mainly with the generation of revenue in the form of licence fees.

However, this does not imply a total absence of pressures on the resource-base of Pulicat lake. Intensity of fishing operations and environmental factors have considerably strained the fishery resources.

The increases in demographic pressure without commensurate increase in the frequency of access to the fishing ground have further led to an enhanced pressure on the already fragile resource-base.

Regarding the main object of the padu system -- compatability in access-rights to prevent conflicts -- it has been successful but only vis-a-vis the villages honouring the padu rights. With the development of an export market for prawns, the dormant tension with the marine-side fishermen, who are excluded from padu waters, has exacerbated into open conflicts.

Thus, the padu system, although enjoying legitimacy with the lagoon fishermen, is currently functioning in a milieu of hostility where the majority of the fishing population in the locality do not honour the rights. To complicate matters further, the attitude of the government is adverse to this traditional system.

The case of Pulicat lake and the padu system also highlights the fact that managing access to the fishing space does not in itself ensure the management of resources. Fisheries with limited access can also be subject to overfishing and overcapitalization as in any open-access fishery, so long as there is no control over the intensity of fishing operations.

If the demand factor is favourable and the frequency of access to the fishing ground is limited, the tendency of fishermen, whether they are part of a self-regulating mechanism or not, seems to be to maximize individual production.

Instead of dismantling the padu system and replacing it with licensing, it would be preferable to strengthen the weaker links in the traditional system with constructive interventions, as in the case of Kattudel fishery in Sri Lanka where the traditional rights to the fishing ground are formally recognized by the State (Atapattu, 1987). There should be legislative protection to the padu rights. But there should, in turn, be a reciprocal consensus to incorporate effort-control measures in this system.

To ascertain the veracity of the contention of padu fishermen that overfishing is because of fishery-independent factors, a bioeconomic and hydrological study of Pulicat lake should be undertaken. Data on production and fishing effort is not now

available and should, therefore, be systematically collected. All arguments of overfishing have so far been essentially based on mere surmises.

To alleviate conflicts over rights to fish, efforts should be made to ensure that fishermen, as far as possible, keep to their traditional fishing grounds. Thus, marine fishermen should be confined to the sea.

Schemes should also be devised to rehabilitate dispossessed peasants and tribals into land-based activities. This will also contribute towards further compatability in the lagoon waters.

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6. GLOSSARY

adappu	- impoundment- fishery
arai valai	- gill-net
badi valai	- shore-seine
chettiar	- village-head
grama panchayat/panchayat	- village council
kovil mandapam	- temple premises
kuppam	- settlement
padagu	- flat bottomed, plank-built fishing boat
padu	1. fishing site 2. turn of fishing
padu kulukkal	- drawing of lots
panchayatar	- member of village council
pattanavan/pattanavar	- traditional marine fishing caste
peria pattanavar	- sub-caste of pattanavar
siru-valai	- bag-net part of suthu-valai
suthu-valai	- stake-net with two components viz, tandukku and siru-valai
tadukku	- wall-shaped net used in suthu-valai
talekettu	- turbaned or privileged
vallikodi	- lure-fishery

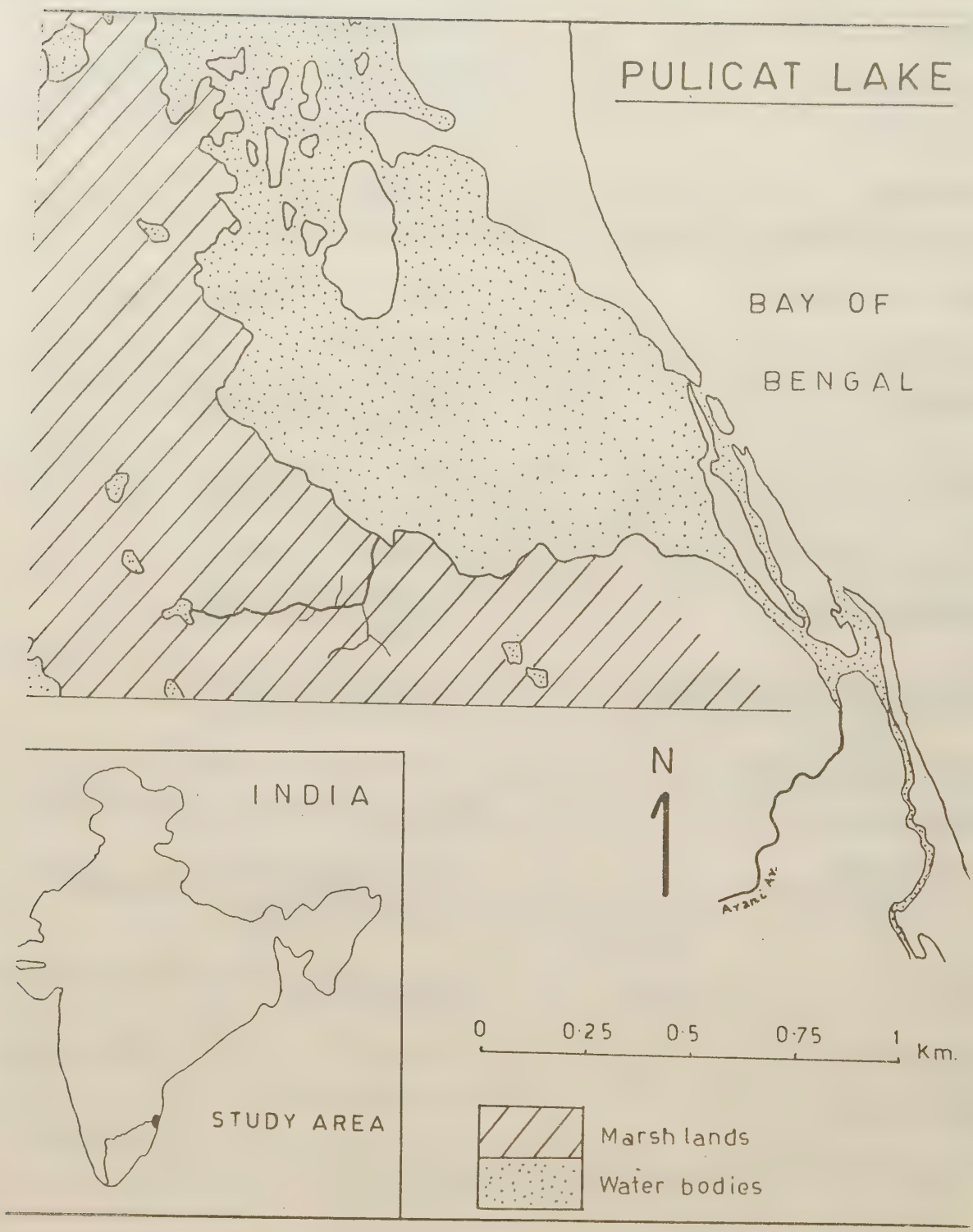

Figure 1 Pulicat Lake

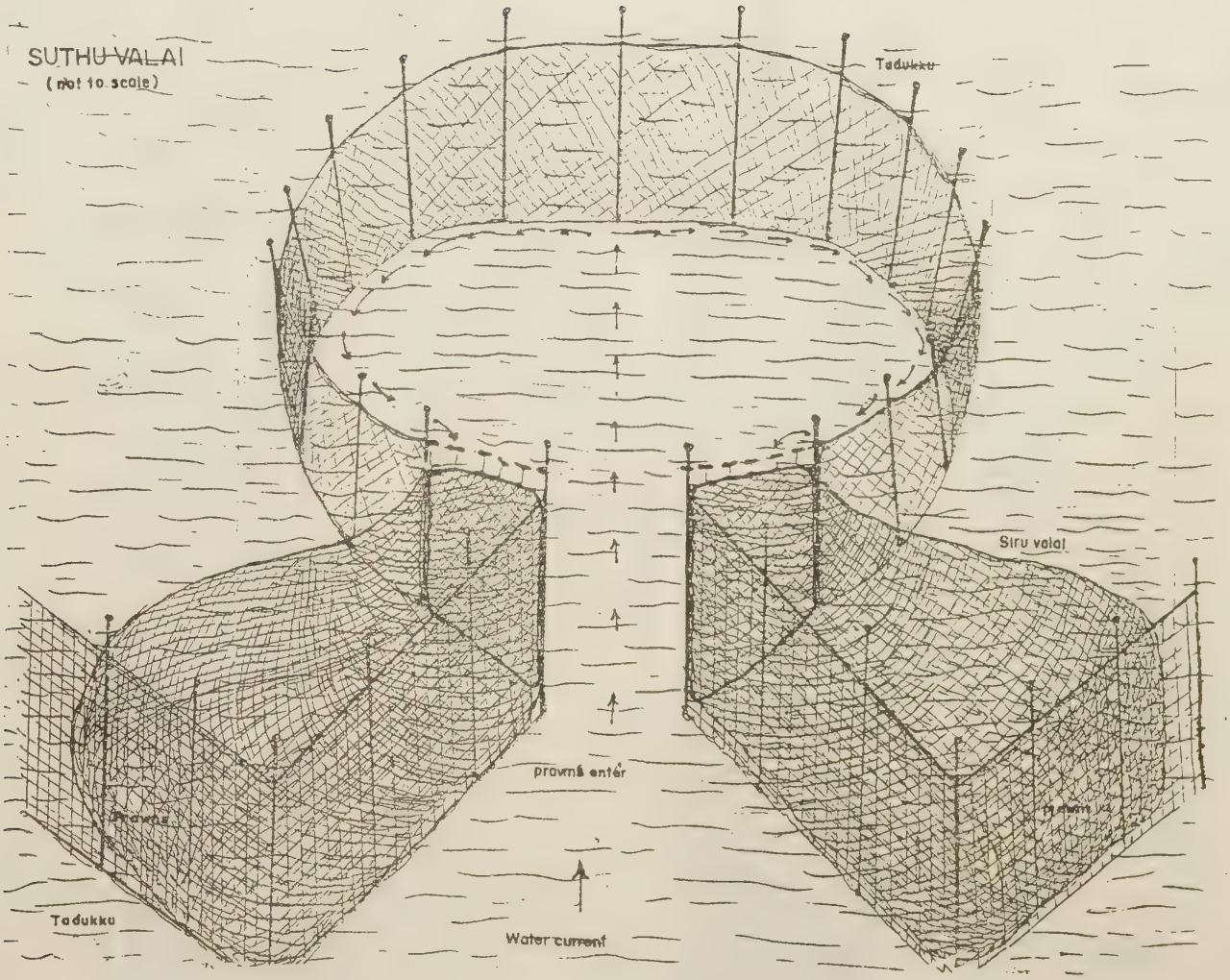

Figure 2 Suthu valai

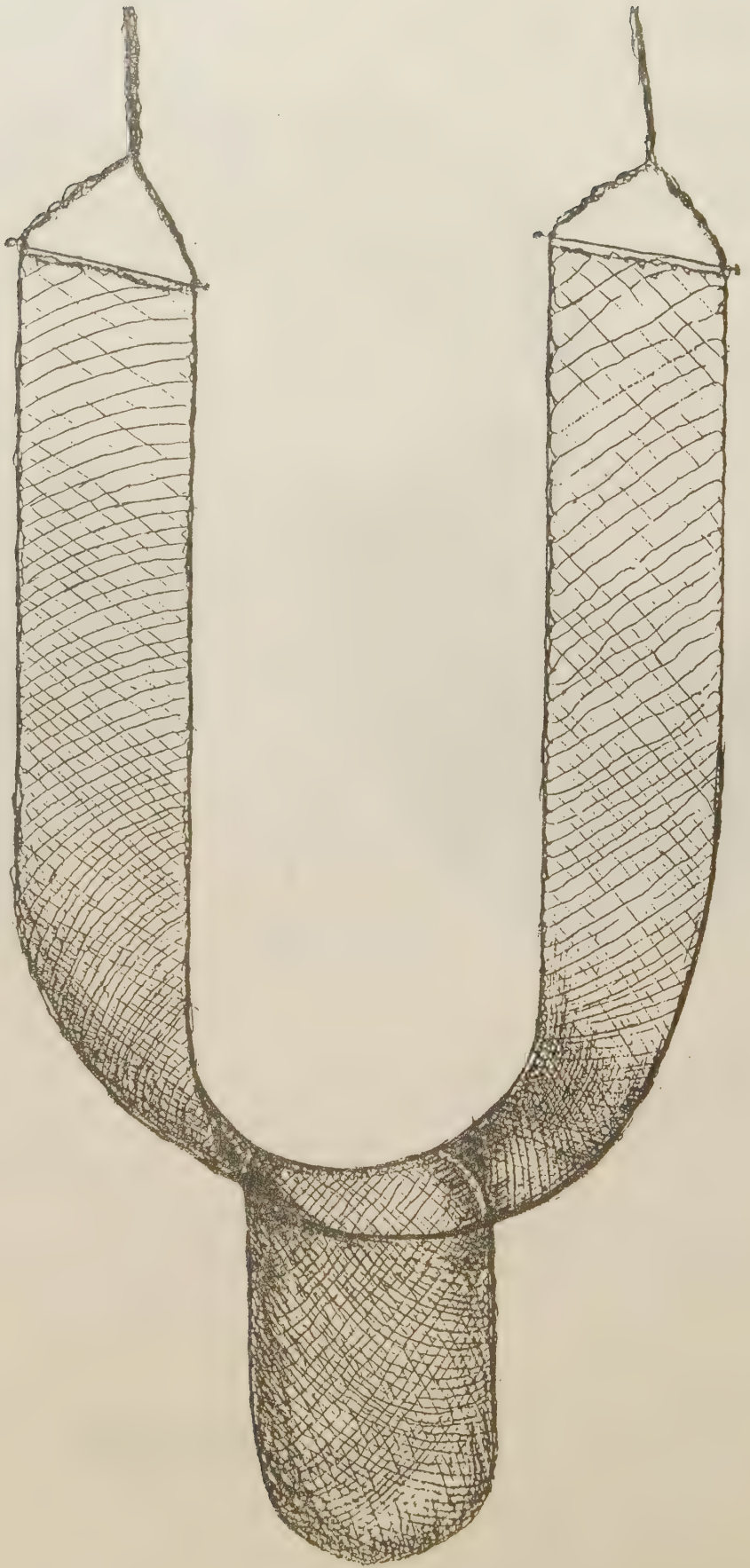

Figure 3 Badi valai
(not to scale)

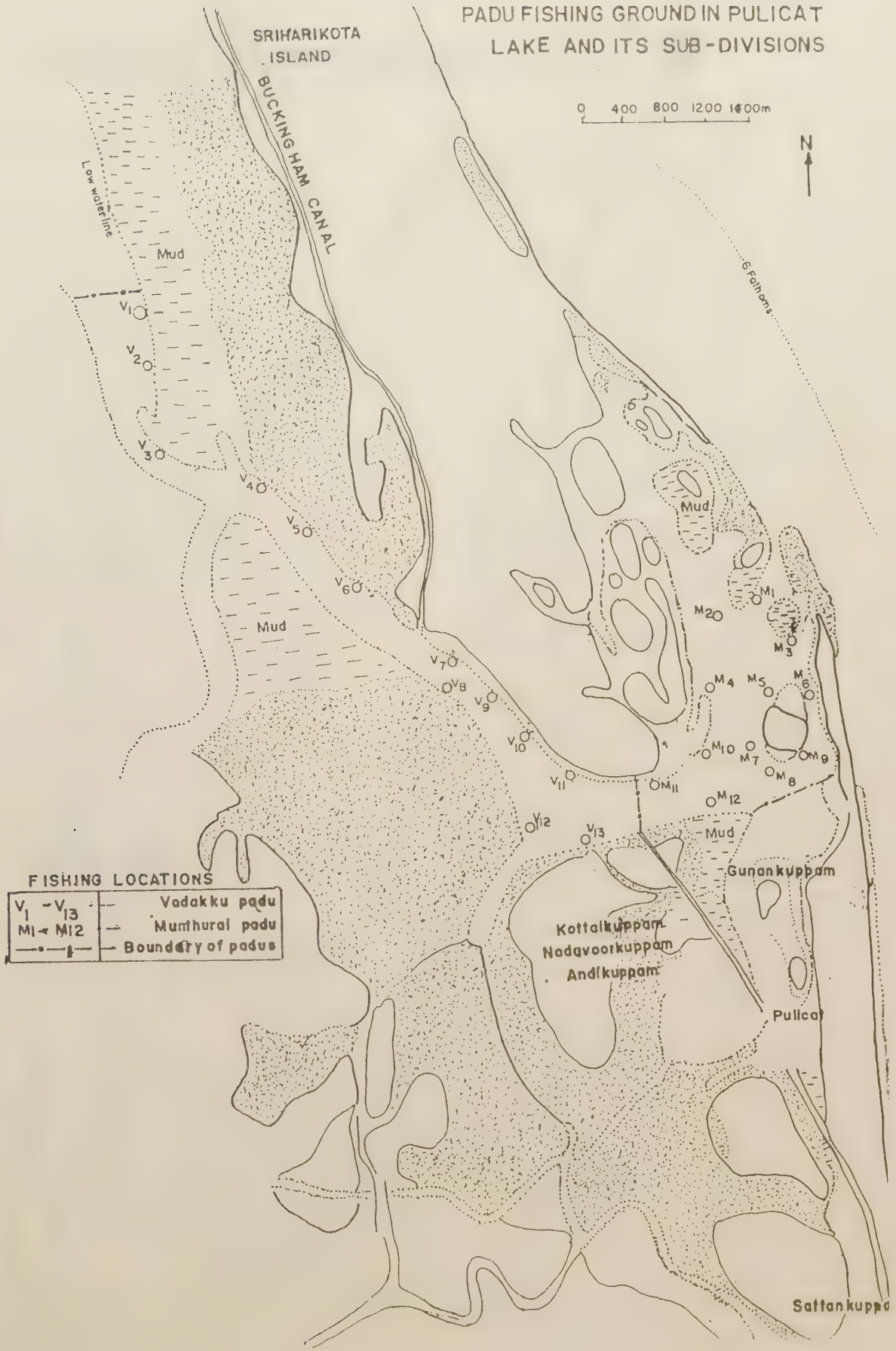

Figure 4 Padu Fishing Ground in Pulicat Lake

Figure 5 Pulicat Lake
Important Fishing Villages, Tamil Nadu

ANNEX

The Sub-divisions of Padu Fishing Grounds and the Number of Units allocated to each location

Name of the Padu	No. of allocated fishing units/day (Suthu valai)
A. VADAKKU PADU	28
1. Bandu padu	2
2. Sethumelai padu	1
3. Naduthurai padu	1
4. Vangu padu	1
5. Chetti padu	1
6. Ajimunai padu	2
7. Katramunai padu	2
8. Chinna padu	4
9. Klinja padu	3
10. Palla padu	3
11. Melathittu padu	4
12. Kattamani padu	2
13. Pasimunai padu	2
B. MUNTHURAAI PADU	28
1. Annamar padu	4
2. Pambu padu	4
3. Nandu padu	5
4. Kusini padu	2
5. Sammankuzhi padu	2
6. Pinnottu padu	1
7. Munnottu padu	1
8. Kakathittu padu	1
9. Jalli padu	2
10. Pana padu	2
11. Padagu padu	2
12. Ultharai padu	2

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